



Performance and *in vivo* Digestibility of High and Low Producing Cows To Maturity and Processing of Corn Silage



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Background

¥The nutritive value of corn silage is difficult to estimate based on laboratory analyses.
¥Samples of corn silage are needed that have digestibility measured *in vivo* and can be used as a reference standards for evaluating current methods and developing new methods for evaluating corn silage.

Objectives

1. Obtain corn silage materials with different digestibilities that can be used as reference standards.
2. Determine the performance and digestibility of corn silages that differ in maturity and kernel processing when fed to higher and lower producing cows.
3. Measure the differences in rate of passage due to the size of corn fiber particles and intake level of cows.

Materials and Methods

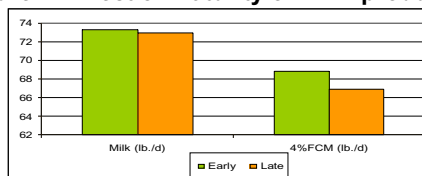
¥Corn silages treatments as a 2x2 factorial design:
¥2 maturities (Early ~30%DM; Late ~40%DM)
¥2 processing (No processing; processing).
¥Diets contained about 70% corn silage fed according to a 4x4 Latin square design
¥24 low producing cows.
¥24 high producing cows.
¥Digestibility was determined using lanthanum (La), as an external marker.
¥Rate of passage was measured using chromium mordant (Cr) and rare earth elements on particles separated from the corn silages.
¥Performances measured:
¥Dry matter intake (every day)
¥Milk production (once a week)
¥Milk composition (every day)
¥Chewing activity (once per period)

Results

Table 1: Characteristics of the corn silages.

	Early		Late	
	Proc	Unpr	Proc	Unpr
Dry Matter (%)	34.2	34.3	40.5	41.2
aNDF (% DM)	38.7	35.6	36.2	33.8
Crude protein (% DM)	6.2	6.7	6.5	6.2
Particle size				
- > 0.75"	2.6	6.3	2.2	4.7
- 0.50 -0.75"	18.9	17.5	11.3	15.9
- 0.25 -0.50"	40.2	56.3	34.7	49.8
- 0.156 -0.25"	12.8	8.4	15.6	10.8
- 0.046 -0.156"	18.6	9.4	22.7	11.8
Pan	6.9	2.2	13.5	7.0

Figure 1: Effect of maturity on milk production



¥Milk production did not differ between the early and late harvested corn silage (Figure 1), but was higher for the processed compared to the unprocessed silages (Figure 2). The opposite response was observed when milk production was measured as 4% fat-corrected milk (FCM).

Figure 2: Effect of processing on milk production

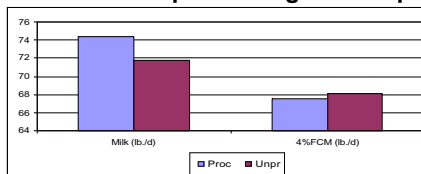


Figure 3: Effect of processing on milk composition

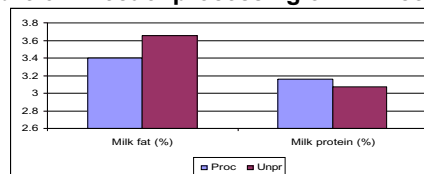
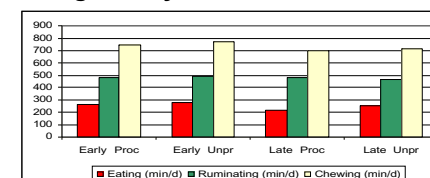


Figure 4: Effect of processing and maturity on chewing activity



¥The combination of lower milk fat (Figure 3) and higher daily body weight gain (not shown) when consuming processed silages suggests that these silages were more fermentable in the rumen.

¥Eating and total chewing times (Figure 4) were greater for early versus later maturity corn silages and unprocessed versus processed silages, which also reflect differences in milk fat test.

¥There was no difference in the dry matter intake of cows when early or later corn silage.

¥The combination of lower milk fat and higher daily body weight gain when consuming processed silages suggests that these silages were more fermentable in the rumen.

¥We are in the process of analyzing the samples for rare earth elements and do not have the results available for digestibility or rate of passage at this time.

Conclusions

¥Regardless of stage of maturity corn silage processing improved milk production.

¥However, it reduced particle size, chewing time and milk fat test.

¥Implementation of processing of corn silage may requires changes in diet formulation and/or management of diet particle size to avoid changes in milk composition.

¥Maturity seems to have an effect similar to processing, with larger particle size, greater chewing time and milk fat content.